



Original Article

Predictors of Physical Activity among Adolescent Girl Students Based on the Social Cognitive Theory

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ABSTRACT

Background: The importance of increasing adolescence girl's level of physical activity is recognized as a priority for having a healthy lifestyle. However, adolescent girls especially Iranian, are at high risk for physical inactivity. Social Cognitive Theory (SCT) is a successful theory to explain physical activity behavior. The aim of this study was to determine the predictors of physical activity based on the SCT.

Methods: This cross-sectional study was conducted among 400 adolescent girls (15-16 yr old) in Tehran, Iran (2013). The participants were randomly chosen with multistage sampling. The SCT constructs consisted of self-efficacy, self-regulation, social support, outcome expectancy, and self-efficacy to overcoming impediments. Statistical analysis was carried out applying SPSS: 16, LISREL 8.8. Stepwise regression was used to test predictors of behavior. Pearson correlation was assessed.

Results: Self efficacy to overcoming impediments was the main construct to predict physical activity (Beta=0.37). Other determinants were self-efficacy (Beta=0.29), family support (beta=0.14), outcome expectancy (beta=0.13), friend support (beta=0.12), and self-regulation (beta=0.11), respectively. In general, the SCT questionnaire determined 0.85 variation of physical activity behavior. All of the constructs had direct significant relation to physical activity behavior ($P<0.001$).

Conclusions: The constructs of SCT provide a suitable framework to perform promoting physical activity programs and self-efficacy to overcoming impediments and self-efficacy are the best predictors of physical activity in adolescent girls.

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Introduction

One of the most important parts of healthy lifestyle is regular Physical Activity (PA). Physical inactivity may lead to overweight and obesity, inflexible muscle, noncommunicable diseases, some cancers, mental and social disorders, and early death¹.

Regular physical activity, especially among adolescence is important for promoting their healthy physical and psychological development. However, there are rising concerns about levels of PA among adolescence (aged 12–18 yr) especially among girls. Inactivity rises with age and is higher in girls and women than men^{2,3}.

An estimated 80% of adolescents (aged 13-15 yr) are physically active insufficient. Globally, the physical inactivity level was the highest in the Americas and Eastern Mediterranean regions where almost 50% of women were insufficiently active³.

In Iran, the prevalence of insufficient physical activity in females aged 15 yr and above is estimated 46.5 and in male 25.2³. In Tehran, Iran, the prevalence of low physical activity in 15-24 yr women was 41%⁴. Sufficient physical activity in

the age group of 5–17 considered at least 60 min of moderate to vigorous intensity physical activity per day³. Therefore, to promote physical activity behavior, awareness of its determinants is needed^{2,5}.

The best interventions are grounded in theory-based approaches that aim to change behavioral patterns. The complexity of physical activity behavior is needed to use behavior change theories to identify the main factors influencing it.

One of the most theories to understand the framework of physical activity behavior is Social Cognitive Theory (SCT)^{6,7}. It is based on a multi-dimensional model that includes intrapersonal/interpersonal characteristics, behavior, and environmental factors. The most constructs of SCT used in the studies were self-efficacy, self-regulation, social support, outcome expectancy, and self-efficacy to overcoming impediments. Various researches considered these constructs to adherence PA in diverse groups^{8,9}.

Thus, because of the importance of promoting physical activity in adolescent girls as persons who have important

role in their family and community in the future, the necessity to determine the effective factors for designing health education programs based on theory¹⁰, and lack of researches to assess the individual, behavioral, and environmental factors effect on PA⁶, this research assessed the power of predicting construct of social cognitive theory to designing PA programs.

Methods

This cross sectional study was conducted on 400 high school girl students in Tehran, Iran, 2013. Participants were randomly selected with multistage sampling. We assigned randomly one area among educational districts in Tehran, Iran. Then a number of schools were randomly chosen. The sample size was estimated based on the number of questionnaire items.¹¹.

The inclusion criteria in this study were girl students aged 15-16 yr old, interested in participating, not attend in other physical activity programs, lack of disability. The exclusion criteria included disagreement of students or their parents to participate, and medical ban to exercise. First, the purpose of this study was explained to the participants. The participants were assigned informed consent form. Then they completed the questionnaires in about 20 min.

This study was approved by the Ethics Committee of Tarbiat Modares University, Tehran, Iran.

Instruments

The demographic variables included age, father and mother job, father and mother education, SCT scale and the short form of the International Physical Activity Questionnaire (IPAQ) were used in this study.

In the quantitative phase of validity, content validity index (CVI) and the content validity ratio (CVR) were assessed. CVR and CVI above 0.62 and 0.79 were accepted, respectively¹². The CVI and CVR for the total items were 0.97-1 and 0.93-1. In the quantitative phase, the content validity index (CVI) assessed the simplicity, relevancy and clarity of items of SCT scale. Content validity ratio (CVR) examined the essentiality of items. Quantitative face validity showed that the range of impact score was 4.6-4.9.

The findings of qualitative content validity were appropriate, regarding to grammar, wording, item allocation and scaling. Briefly, grammar, wording, item allocation and scaling of the SCT questionnaire were evaluated qualitatively by an expert panel consisted of 10 health and physical education specialists. In the qualitative face validity all participants acknowledged that they had no problems in reading and understanding the items. Face validity was assessed by 10 students to evaluate the scale for difficulty, irrelevancy or ambiguity in responding to the questionnaire (qualitative method).

The reliability of the SCT scale was evaluated by means of internal consistency and test-retest reliability methods. The internal consistency was assessed by Cronbach's alpha coefficient in 30 students. The alpha values of 0/70 and above were satisfactory. The average of Cronbach's alpha for the subscales was 0.9 (0.83-0.97). Students (n= 30) completed the questionnaire twice with two week interval for assessing the stability (test-re-test reliability) by intraclass correlation

coefficient (ICC). The ICC was good to excellent (ICC ranged from 0.63 to 0.91).

We specified the construct validity of SCT scale by administering confirmatory factor analysis (CFA). We conducted CFA by means of maximum likelihood estimation. Confirmatory factor analysis confirmed the six factor structure (self-efficacy, self-regulation, family support, friend support, outcome expectancy, self-efficacy to overcoming impediments). All T-values were significant ($P < 0.05$). Fit indices displayed that the SCT model fitted to the data (Table 1).

Table 1: Fit indices of the measurement model using Social Cognitive Theory (SCT)

Fit index	χ^2	df	χ^2/df	GFI	AGFI	RMSEA	RMR
SCT	2065.96	930	2.22	0.84	0.83	0.04	0.02

Self-efficacy scale

Self-efficacy scale was a 10 item instrument. The response range was 0% to 100% (0%=could not to 100%=positively could exercise). Self-efficacy was defined as personal confidence in the ability to perform the given behavior⁹. (Alpha=0.85, ICC=0.90, CVI=0.99, CVR=0.94)

Self-efficacy to overcoming impediments scale

Self-efficacy to overcoming impediments scale included 4 items with Likert format (1= not at all sure to 5= totally sure). This variable was defined as the confidence that the person has in overcoming barriers while performing a specific behavior⁹. (Alpha=0.80, ICC=0.81, CVI=1, CVR=1)

Social support scale

Social support structure with six items assessed participant's perception of their family and friends support for the exercise, separately. This items were measured on a five point Likert format (1= none, 5= very often). Many people believe that the behavior change is easier when they receive family/friend support and it is an incentive for behavior change⁹. (Family support: Alpha=0.79, ICC=0.80, CVI=1, CVR=0.91, and friend support: Alpha=0.83, ICC=0.63, CVI=1, CVR=0.91)

Outcome expectancy scale

Outcome expectancy indicated the people's level of agreement with negative or positive statements regarding the possible effects of exercise (1 = not at all likely to 5 = extremely likely). Participants indicated the value of each outcome, by ranging from (1= not at all important to 5= extremely important). A person must value the outcomes that she believes will occur as a result of performing a behavior⁹. Outcome expectancy and the value of outcome expectancy scales were included 10 items, separately. (Alpha=0.78, ICC=0.80, CVI=0.98, CVR=0.93)

Self-regulation scale

Participants respond to nine item self-regulation construct on a five-point Likert scale (1 = not at all describe; 5 = describe completely). Self-regulation construct is an integral part of an individual's ability to exert control over their external and internal environment¹³. (Alpha=0.81, ICC=0.75, CVI=0.97, CVR=0.94).

We applied Banville et al. method¹⁴ to cross culturally translate of the questionnaires. Two independent bilingual

health researchers translated the original scales to Persian. Blind to the original questionnaire, the other two bilingual health researchers translated Persian form in English. Finally, an expert team comprising the translators and researchers reviewed all the translation and cultural adaptation processes. Agreement in terms of semantic, idiomatic and conceptual equivalence was reached and a final version of the scale was provided¹⁵.

Physical Activity Measure

Physical activity was measured by the short form of the International Physical Activity Questionnaire (IPAQ). The IPAQ assesses exercise intensity and duration based on minutes and days¹⁶. This form records the activity of four intensity levels: 1) Vigorous-intensity activity 2) Moderate-intensity activity 3) Walking; and 4) Sitting. There are three levels of physical activity proposed to classify populations: low, moderate and high¹⁷.

The validity and reliability of the IPAQ were approved in several studies^{18,19} and this research (ICC=0.85).

Data Analysis

The power of predicting PA behavior based on SCT constructs was assessed by Multiple Linear Regression and Stepwise Regression. Data were analyzed through SPSS: 16 (Chicago, IL, USA) and LISREL8.8.

Results

Girl students participated in this study were 15-16 yr old. Majority of the parents were low literate. Most of father's jobs were employee and majority of mothers were housekeepers. Besides, 100% of subjects had insufficient physical activity. Demographic characteristics and physical activity rate of participants are provided in Table 2. The SCT accounted for 0.85 variance of physical activity behavior.

Table 2: Demographic characteristics and physical activity rate/ level of the Participants (n=400)

Variables	Results
Age (yr)	
Mean (SD)	15.52 ±0.50
Father job, n (%)	
Worker (labor)	43 (10.8)
Employee	120 (30.0)
Self-employed	197 (49.2)
Retire	31 (7.8)
Unemployed	9 (2.2)
Mother Job, n (%)	
Worker (labor)	5 (1.2)
Employee	41 (10.2)
Self-employed	17 (4.2)
Retire	2 (0.5)
Housekeeper	335 (83.8)
Father education, n (%)	
Illiterate	49 (12.2)
Low literate	305 (76.2)
Diploma	28 (7.0)
Bachelor	18 (4.5)
Mother education, n (%)	
Illiterate	59 (14.8)
Low literate	302 (75.6)
Diploma	23 (5.8)
Bachelor	16 (4.0)
Physical activity (min/week)	
Mean (SD)	53.12 ±13.92
Physical activity, n (%)	
Inactive (0 min/week)	0 (0.0)
Less active (<420 min/week)	400 (100)
Active (≥420 min/week)	0 (0.0)

Self-efficacy to overcoming impediments was the main predictor of physical activity. This construct had a significant positive effect on physical activity behaviors, and one unit increase in self-efficacy to overcoming impediments led to 4.66% increase in target behaviors (β=0.37).

Other determinants were self-efficacy (β=0.29), family support (β=0.14), outcome expectancy (β=0.13), friend support (β=0.12) and self-regulation (β=0.11), respectively. The items of constructs and detailed results are presented in Table 3 and 4. The correlations of all constructs were significant (Table 5).

Table 3: Item of construct social cognitive theory

Constructs/Items
Self-Efficacy
I could exercise during or following a personal crisis
I could exercise when feeling depressed
I could exercise when feeling anxious
I could exercise during bad weather
I could exercise when on vacation
I could exercise when there are competing interests (e.g. Watching television)
I could exercise when I have a lot of work to do
I could exercise when I don't receive support from my family/ friends
I could exercise when exercising is not enjoyable
I could exercise when I haven't reached my exercise goals
Self-Regulation
I often set exercise goals
My exercise goals help to increase my motivation for doing exercise
I tend to break more difficult exercise goals down into a series of smaller goals
I usually keep track of my progress in meeting my goals
If I do not reach an exercise goal, I analyze what went wrong
Exercise is generally not a high priority when I plan my schedule
I schedule my exercise at specific times each week
I write my planned activity sessions in an appointment book or calendar
I never seem to have enough time to exercise
Family support
Exercised with me
Gave me encouragement to stick with my exercise program
Planned to exercise on recreational outings
Talked about how much they like to exercise
Helped plan activities around my exercise
Made positive comments about my physical appearance
Friend support
Exercised with me
Gave me encouragement to stick with my exercise program
Planned to exercise on recreational outings
Talked about how much they like to exercise
Helped plan activities around my exercise
Made positive comments about my physical appearance
Outcome expectancy
I will feel less depressed and/or bored
I will improve my self-esteem
It will make me feel tired
I will feel less tension and stress
I will improve my health or reduce my risk of disease
I will do better on my job
I will feel more attractive
I will improve my heart and lung fitness
It will cost too much money
I will increase my energy level
Self-efficacy to overcoming impediments
Get up early, even on weekends, to exercise
Stick to your exercise program after a long tiring day of school /work
Attend a social event/party only after exercising
Stick to your exercise program even when you have excessive demands of school or work

Discussion

It is of great importance to recognize the effective factors of PA behavior on different groups for designing the efficient health education interventions⁸ to promote exercise behavior.

This study was conducted to determine the factors that lead to promote regular physical activity.

Table 4: Predictors of physical activity behavior based on the Social Cognitive theory (dependent variable: physical activity)

Model	Unstandardized coefficients		Standardized coefficients	t	P value
	B	SE	Beta		
Self-efficacy to overcoming impediments	4.66	0.40	0.37	11.54	0.001
Self-efficacy	3.72	0.27	0.29	13.65	0.001
Friend Support	2.98	0.49	0.12	6.00	0.001
Family Support	4.14	0.64	0.14	6.37	0.001
Self-Regulation	2.12	0.39	0.11	5.44	0.001
Outcome expectancy	1.68	0.36	0.13	4.64	0.001

This investigation demonstrated that adolescent girl students were not adequately active. Therefore, it was required to examine the physical activity behavior in this

Table 5: Correlations between the constructs of SCT defining physical activity behavior of school students (n=400)

Construct	Mean ±SD	1	2	3	4	5	6
1 Self-efficacy to overcoming impediments	5.35 ±1.03	1.00					
2 Self-efficacy	4.28 ±1.03	0.58	1.00				
3 Friend Support	1.41 ±0.56	0.50	0.29	1.00			
4 Family Support	2.16 ±0.44	0.58	0.44	0.45	1.00		
5 Self-Regulation	2.39 ±0.71	0.51	0.22	0.47	0.42	1.00	
6 Outcome expectancy	2.23 ±1.04	0.79	0.49	0.52	0.50	0.47	1.00

In Dishman et al. study, self-efficacy to overcoming barriers to physical activity was stable across the high school years and was not directly or indirectly related to changes in physical activity. Rather, self-efficacy moderated the relation between changes in PA and social support. Girls who maintained higher perceptions of social support had less decline in PA, but only if they also had high self-efficacy to overcoming barriers to physical activity²¹. In Solymanian dissertation, the effect of self-efficacy on exercise behavior was mediated by self-regulation. In other words, high self-efficacy increases the use of self-regulation strategies¹³.

Family and friend support had a moderate effect on exercise behavior. The items of these construct were similar, but with a little different, family support was more important. Rutkowski et al. showed that a statistically significant inverse relationship is found between parental physical activities and the activity levels of adolescents ($r=-.23$, $P<.05$). Typically, these parents do not share their physical activity time with family members¹⁹.

But the result of Duncan et al. research showed the importance of parental support in promoting physical activity among adolescents²². Pirasteh et al. research²³ on girls showed that the self-efficacy scale contained a single factor, the social support scale contained two factors: family support and friend support. However, self-efficacy was the most important predictor to PA behavior²³. Besides, outcome expectancy had a moderate effect on physical activity behavior.

Ramirez et.al research based on the SCT indicated positive effect of self-efficacy, outcome expectations, and social support on physical activity behavior in children²⁴. In that study, self-regulation had the least significant effect on PA behavior. This finding is consistent with the results of Edmund²⁵, self-regulation is a process that influences motivation and behavioral change. Self-regulation means that the individual needs goal-setting, planning, and problem solving in order to achieve their personal needs. Self-

regulation refers to processes that enable individuals to guide their goal-directed activities over time²⁶.

target group. Our findings confirmed to the determined 0/85 variation of physical activity. Generally, range of $0.8 <$ has a good fit indices to model¹³. Therefore, constructs of SCT can use to designing educational intervention for promoting physical activity behavior as a framework.

Our results showed that all of the constructs of SCT were significantly associated with PA, with self-efficacy to overcoming impediments, self-efficacy, family support, friend support, outcome expectancy, and self-regulation. Self-efficacy to overcoming impediments was the strongest predictor of exercise behavior. This construct is essential to have regular physical activity. Self-efficacy was a significant predictor of PA behavior. This is consistent with the result of Haider et al.²⁰. In that study, low scores for social support and self-efficacy to overcoming impediments was also found²⁰.

regulation refers to processes that enable individuals to guide their goal-directed activities over time²⁶.

Wolfe in her dissertation showed that using constructs of SCT was successful in increasing the short and long-term exercise rates of the participants⁸. Self-regulation has the potential to be an important construct to include in future interventions. Self-efficacy increased throughout the study, but was non-significant between groups at post-test. Social support and outcome expectancies appeared to have been the least successful strategies learned in the intervention for exercise adherence⁸.

But Haider in his dissertation assessed the role of self-efficacy, social support, outcome expectancies, and self-efficacy to overcome barriers as predictors of exercise among college students in South Asia. Only self-efficacy was predictive of exercise behavior⁹. In Mehta dissertation, self-efficacy, self-regulation, and expectation had effect on PA behavior on middle aged women²⁷.

This research has some limitations: First, the result of physical activity was based on self-report. Therefore, it may be affected on findings. Second, this study was done on a sample of Tehranian adolescent girl students. Therefore, the findings of this study have to be interpreted with some caution. Further studies are needed with regard to larger samples in the other areas. It is suggested to evaluate the effect of an educational intervention based on the findings of this study in the target group.

Conclusions

Designing interventions based on construct of SCT to promote physical activity behavior must take into consideration the reinforcing the constructs that are stronger predictors of behavior can lead to more effective interventions. Regarding to self-efficacy to overcoming impediments and self-efficacy as the main factors in order to increase PA behavior in adolescent seems effective.

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Conflict of interest statement

None declared.

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